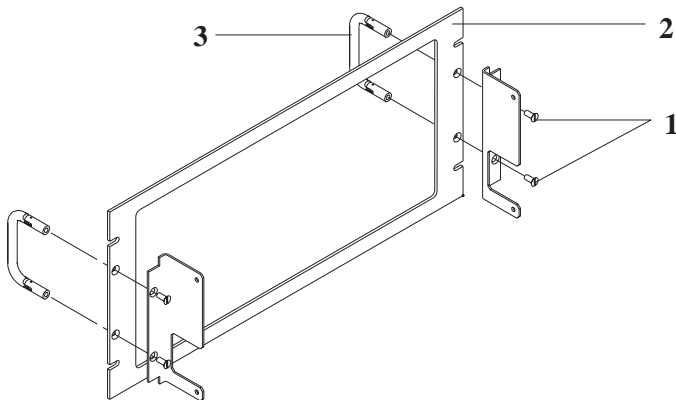
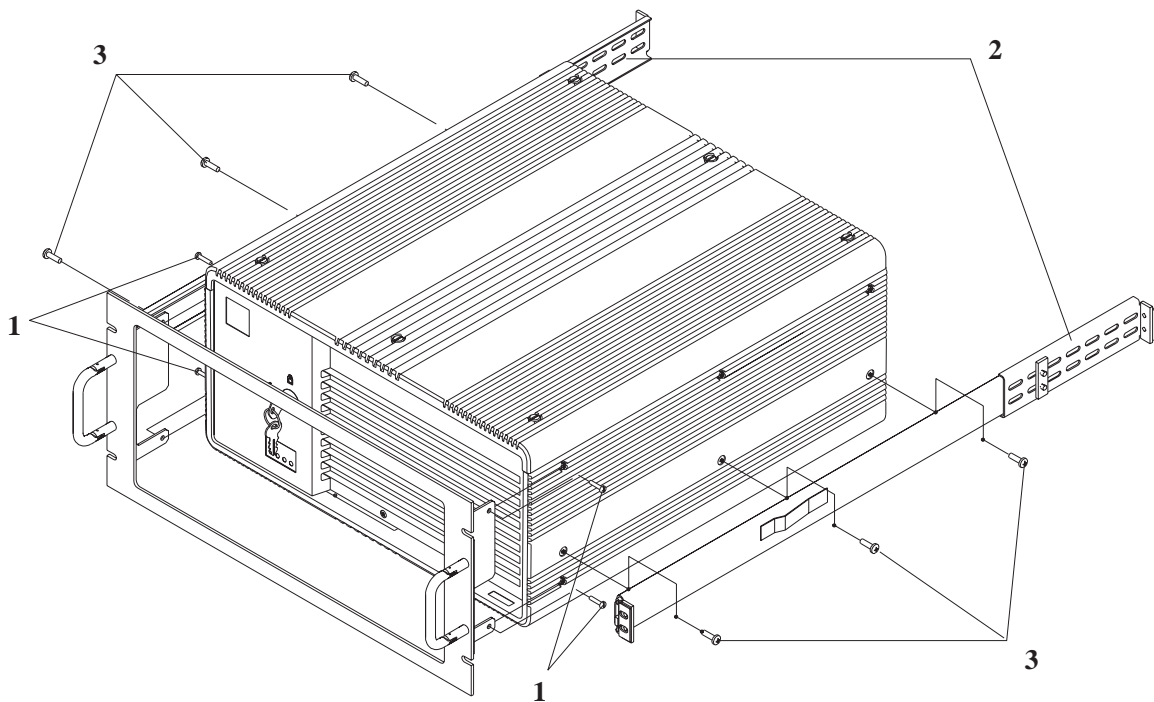


Installing the Rack-Mount Option

1. Assemble the front-plate assembly by pushing the flat-head screws (1) through the plate (2) and into the handles (3) as shown.



2. Assemble the front-plate assembly onto the system unit with the notches in the mounting bracket toward the bottom.
3. Secure the front-plate assembly to the system unit using the four pan-head screws (1) supplied with the rack-mount kit.

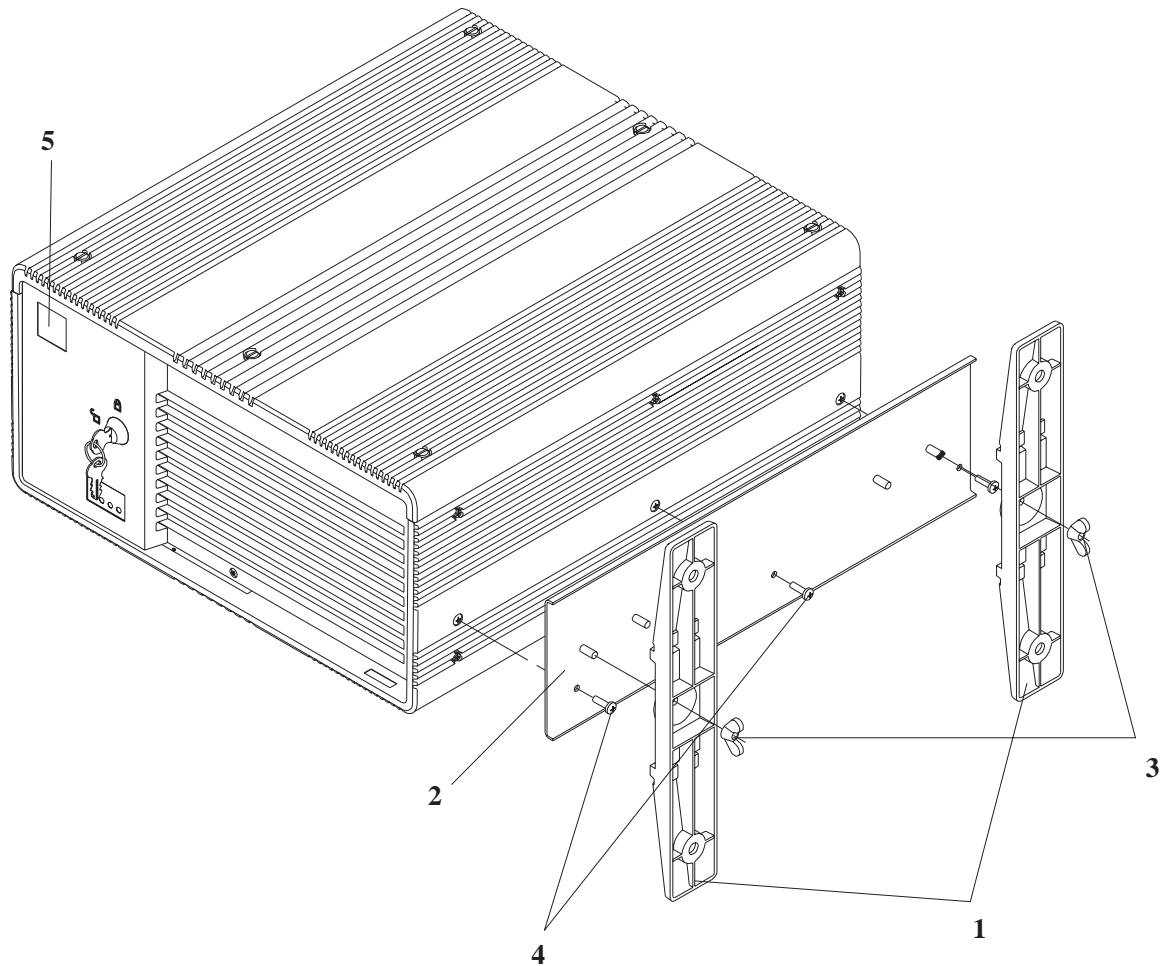


4. Using the instructions provided with the rail kit, install the rack-mount rails (2) onto the system unit using the supplied screws (3).

Installing the Floor-Stand Option

1. Assemble the floor-stand assembly by placing the feet (1) onto the plate (2) using the thumb screws (3). Install the feet on the studs closest to the end to provide more stability.

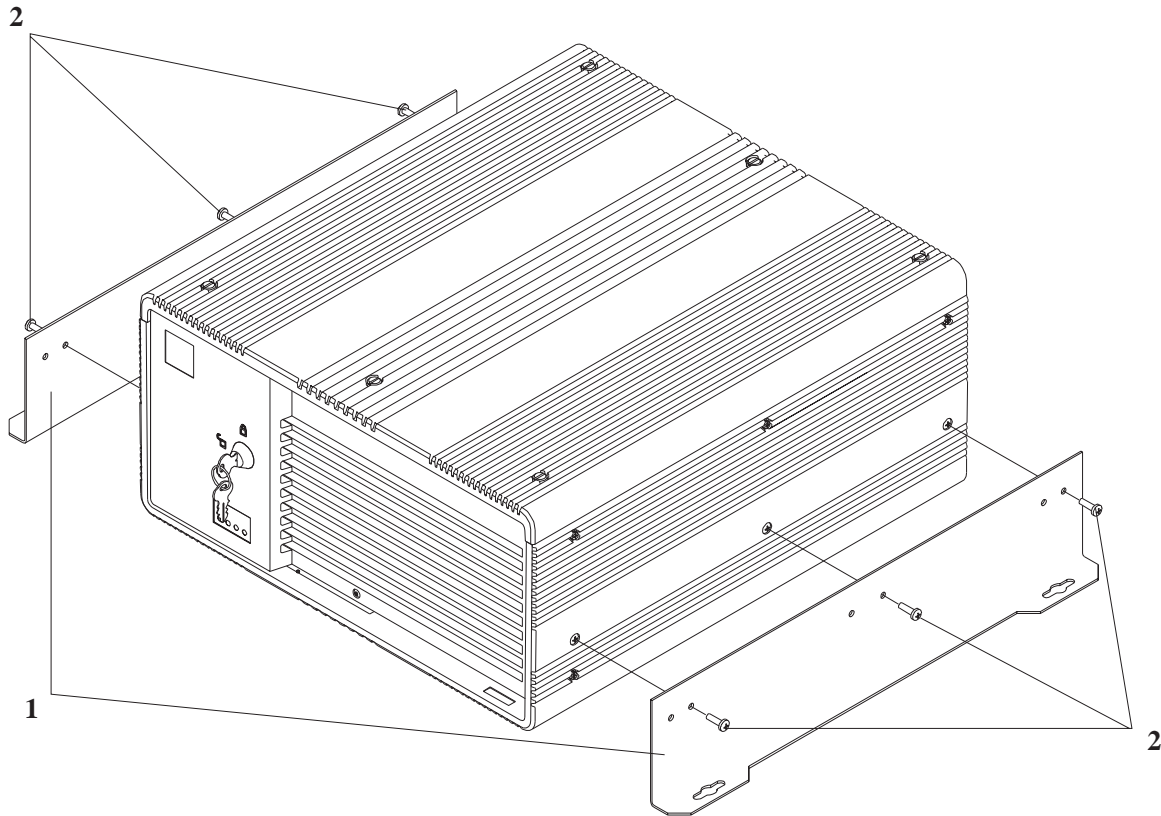
Note: The mounting plate has four studs for mounting the feet, two studs in the front and two studs in the back. When systems are being placed next to each other, the feet can be staggered to allow the systems to be closer together.



2. Lay the 7588 Industrial Computer on its side with the bottom of the unit supported 6 inches (150 mm) off the floor.
3. Install the foot assembly onto the system unit using the three screws (4) supplied with the kit.
4. Make sure that the orientation of the plate centers the feet on the system unit, and then stand the unit upright.
5. Replace the logo (5).

Installing the Panel-Mount Option

1. Install the panel-mount rails (1) to the sides of the system unit using the six screws (2) in the holes as shown.



2. Make sure that the panel where you install the 7588 Industrial Computer meets all applicable safety codes for that location. The panel must be at least a 12-gauge (2.67 mm/.105 inch) steel panel, and the mounting screw must be at least an M5 pan-head screw.

Chapter 4. Operating and Configuring Your System Unit

The operation of your IBM 7588 Industrial Computer depends on the IBM 586 or 586E Single-Board Computer (processor card), system configuration, operating system, and application programs in your particular system unit. The first part of this chapter provides very general operator information concerning the features of the 7588 Industrial Computer. The remainder of the chapter explains how to use the different screens of the Configuration/Setup Utility.

Operator Information

Your system unit contains the following features:

On/Off power switch

The On/Off power switch is located on the front panel.

Light-emitting diodes (LEDs)

The 7588 Industrial Computer has four light-emitting diodes (LEDs) located on the front panel.

- The left-most LED (green) indicates power is on.
- The next LED (yellow) indicates a hard drive is reading or writing data.
- The next LED (yellow) is the speaker LED. It is connected to the speaker and blinks each time the speaker beeps. It provides a visual indication to the user who might not be able to hear the speaker.
- The right-most LED (yellow) is not connected and can be used with any device where visual signals to the user are required. The connector is behind the LED.

Power supply

The power supply on the 7588 Industrial Computer is auto ranging. It will work properly if:

- The voltage range in your country is between 90 and 137 volts.
- The voltage range in your country is between 180 and 265 volts.

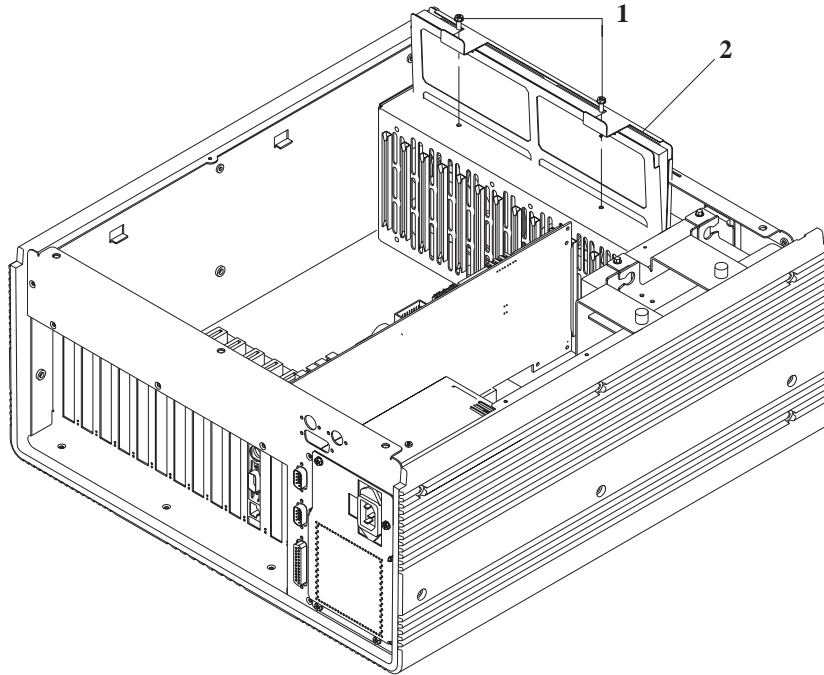
Attention:

If the voltage is not in the correct range, you could damage your system unit when you turn it on.

Cleaning Air Filters

The 7588 Industrial Computer contains a single foam-type air filter that must be cleaned or replaced periodically.

1. Remove the cover (refer to page 3-2).
2. Remove the two screws (1) holding the filter assembly in place.
3. Lift the filter assembly (2) out of the system unit.



4. Remove the filter from the frame and replace it with a new filter.
5. Reinstall the filter assembly and screws; then the reinstall the cover.

Starting Up Your System

Before turning on your computer, make sure all of the following conditions are met:

- All internal and external options have been installed properly.
 - The power supply switch is set correctly.
 - All signal cables are properly connected.
 - All power cables are plugged into grounded electrical outlets.
 - The cover and all mounting hardware are properly installed.
1. Turn on your display and adjust the brightness and contrast controls to the approximate midpoint.
 2. Turn on the system unit.

The power-on indicator light comes on.
 3. Watch the display screen and listen for a single beep.
 4. If you have not installed the operating system, go to the instructions that came with your operating system.

Installing Application Programs

For your system unit to be able to perform the tasks that meet your needs, you must install application programs. For information about installing and using your application programs, refer to the manuals that came with the application programs.

Note: Before installing any application program, make sure that your computer has enough storage available for that program.

Security Features

Security involves protecting your system unit components and preserving the data stored in your system unit. There are several security features available to help protect your system unit, the hardware inside, and the information stored on your hard disk.

Diskette Drive and Hard Drive Access: Access to drives can be disabled to prevent unauthorized reading or writing to the IDE hard drives and the diskette drive. The hard-drive option affects all IDE hard drives (they cannot be set independently).

The option is selected in the Configuration/Setup Utility program. See “System Security Option” on page 4-13.

Serial and Parallel Port I/O Control: This feature can disable input and output functions of the serial and parallel ports and their attached devices. The control of this feature is set by accessing the **Devices and I/O Ports** option in the Configuration/Setup Utility program.

Passwords: Password security is implemented by a power-on password, a System Administrator password, and a keyboard password. The Configuration/Setup Utility program gives directions for setting, changing, and disabling the passwords. The **System Security** option on the Configuration/Setup Utility main screen (see Figure 4-11 on page 4-13) contains the fields for setting, changing, or disabling power-on or administrator passwords.

If it should become necessary to remove either a power-on password or System Administrator password because it is forgotten or for servicing, follow the procedure given in “Removing a Power-on or System Administrator Password” on page 4-4.

Power-on Password: A power-on password denies access to the system unit by an unauthorized user when the system unit is powered on. When a power-on password is active, the password prompt appears on the screen each time the system unit is powered on. The system unit starts only after the correct password is entered.

System Administrator Password: The system-administrator password restricts access to the Configuration/Setup Utility, which controls the security features. After the system-administrator password is set, the password prompt appears each time someone attempts use the Configuration/Setup Utility program.

Removing a Power-on or System Administrator Password: If you need to remove either the power-on or system-administrator password:

1. Turn off the computer (refer to page 8-29).
2. Remove the cover (refer to page 3-2).
3. Using Figure 6-1 on page 6-2, locate the password clear pad.
4. Use a screwdriver or other conductive device to short the two pads on the password clear jumper for 10 seconds. An alternative method is to remove the battery for 10 minutes.
5. Reinstall the cover.
6. Turn on the computer and run the Configuration/Setup Utility program.
7. If a password is required, you must enter a new one.

Keyboard Password: A keyboard password allows locking the keyboard while the computer is running. Setting the keyboard password depends on the operating system. The OS/2 operating system provides keyboard-password protection as a standard feature; other operating systems may or may not offer this feature. Refer to your operating system documentation for more information.

Startup-Sequence Control

The system unit has a default startup sequence that checks diskette drives first, then any available hard drive, then any other startup device that may be installed. You can change the startup sequence by arranging the startup devices in any order that meets your needs. For example, you can make your hard drive your primary startup device, thereby preventing a person from starting the system unit from a diskette drive. You can *customize* the startup sequence by changing the order in which the system unit checks the devices by accessing the Configuration/Setup Utility program.

Keyboardless Operation Mode

The **Start Options** option on the Configuration/Setup Utility program main screen lets you select to start the system unit without a keyboard attached. This mode of operation commonly is used when the system unit has been set up as a network server.

Configuration Information

Your system unit has a special type of memory that maintains an inventory of its features and their associated settings. This inventory is the *configuration information*. A memory-retention battery on the processor card keeps the memory active so it does not lose the configuration information when you turn off the system unit. The battery-backed memory contains information about the following:

- Cache memory
- Date and time settings
- Diskette drives and hard disk drives
- Keyboard and mouse information (if attached)
- Memory map
- Power management
- Processor information
- Security features and passwords
- Selectable features
- Serial and parallel ports
- Video information.

Many built-in features, such as the serial and parallel ports, have programmable settings. Each time you turn on the system unit, the settings are copied from memory to the various features to get them ready for operation. You can change these settings using the Configuration/Setup Utility program.

You also use the Configuration/Setup Utility program to update the configuration information whenever you install an optional feature.

Each device in your system unit configuration must have a unique setting. The microprocessor uses the configuration settings to communicate with each device in your system unit. If two devices have the same setting, the conflict prevents the microprocessor from sending specific instructions to either device.

ISA-bus (AT-bus) compatible, 16-bit adapters have either fixed settings or settings that you control through jumpers or switches. Refer to the documentation that comes with the adapter for information about jumper settings. You cannot control these settings by using the Configuration/Setup Utility program. However, you can use the Configuration/Setup Utility program to change the setting of a built-in feature to one that does not conflict with an adapter. For example, a conflict occurs if you install a serial adapter set as Serial 1 (primary), because your built-in Serial A port already has that setting. Use the Configuration/Setup Utility program to change the built-in Serial 1 port assignment to another setting, if possible, or to disable it.

Each time you power on the system unit, the power-on self-test (POST) compares the stored configuration information with the installed hardware. If there is a mismatch, POST displays a configuration error. A configuration error can occur under any of the following conditions:

- You added or removed memory or a drive.
- You did not turn on an external device.
- A device is not working correctly and POST cannot detect its presence.
- A configuration conflict exists (two devices have the same settings).

If a configuration error occurs, the first and then the second of the following messages appears on the screen, or just the second message appears.

POST error(s) detected. Press any key to exit POST error log.

The following error(s) were detected when the system was started.

162 Configuration change has occurred

Press Enter to run the Configuration/Setup Utility or Esc to continue.

When the error message appears, the pop-up screen gives you a choice: you either can press Enter to run the Configuration/Setup Utility program, or press Esc to bypass the error and continue with the operating system startup.

If you just added or removed an option, running the Configuration/Setup Utility program automatically updates the configuration information for the option you just added or removed, without affecting the settings of any other features.

Using the Configuration/Setup Utility Program

The Configuration/Setup Utility program is a tool you can use for viewing and changing the configuration of your system unit. This utility program performs a number of tasks automatically, but there are other tasks that require input from you. You have access to such tasks as working with the configuration, setting a power-on or administrator password, and changing the date and time.

The memory-retention battery keeps the configuration memory active, even when you turn off your system unit. If the battery fails, the memory loses the settings and the Configuration/Setup Utility program automatically restores your system to the default (factory) settings.

Note

Pressing F5 while in the Configuration/Setup Utility program restores your system unit configuration to the default (factory) settings. Use care with this restore function; it attempts to preserve diskette drive types and avoids setting a configuration that has conflicts.

The Configuration/Setup Utility program gives you the opportunity to view, and in some cases, change information about your system unit. This utility program automatically notes changes that occur in your system unit hardware.


When you look at the Configuration/Setup Utility program screens, you notice that some *fields* (data areas) have square brackets, while other fields contain text only. The square brackets indicate a field you can change; the Configuration/Setup Utility program fills in all other fields. If you see an arrow head pointing to any of the fields on the screen, the Configuration/Setup Utility program is noting configuration changes that have occurred since the last time you used the program.

Getting Help

Pressing F1 for a highlighted field on any screen will display Help information for that field.

Accessing the Configuration/Setup Utility Program: If a configuration error occurs during POST, the Configuration/Setup Utility program displays a message that describes the errors found by POST and gives you the option to access the utility program. You also can access the Configuration/Setup Utility program any time you want to check your settings.

To access the Configuration/Setup Utility program, do the following.

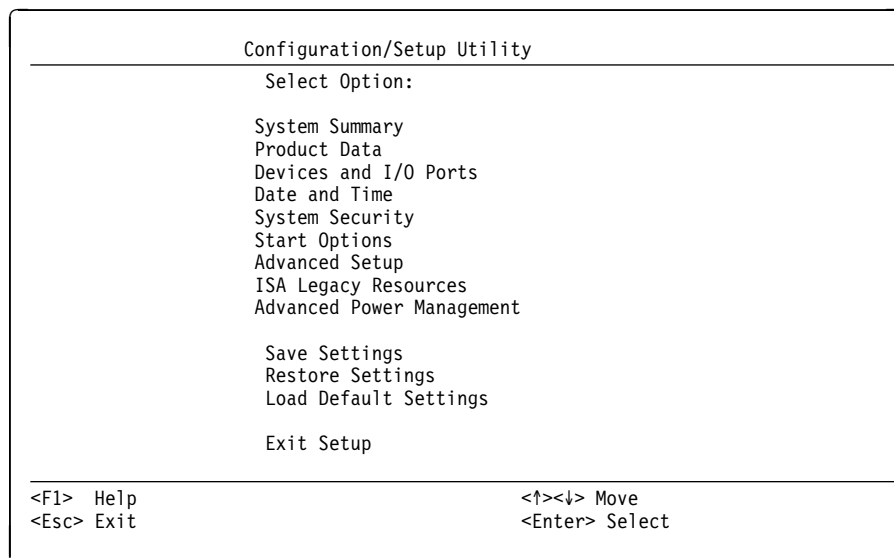
1. Remove all media (diskettes, CDs, tapes, and so forth) from all drives.
2. Turn on the system unit. If it is already on, you must turn off the system unit for a few seconds, then turn it back on.
3. While the POST memory test is counting, the Configuration/Setup Utility program symbol  appears in the upper-right corner of the display screen. Press F1 while the memory is still counting to access the Configuration/Setup Utility program and skip the memory testing. The Configuration/Setup Utility program main screen appears.

Note: If you have set an Administrator Password, a password prompt appears. You must type the correct Administrator Password before you can use the Configuration/Setup Utility program.

You can get help information about any item on the screen by moving the cursor to the field and pressing F1. The active keys are shown at the bottom of each screen in the Configuration/Setup Utility program.

Moving Around the Configuration/Setup Utility Screens: Use the up arrow and down arrow keys to move from one field to the next. Each field is highlighted as you move from one option to another. Use the left arrow and right arrow keys to change the setting within fields that have square brackets. Press the Page Down and Page Up keys to move from page to page. When you are ready to exit from the Configuration/Setup Utility program, press Esc and follow the instructions on the screen.

The Configuration/Setup Utility program main screen contains the following options.



```
Configuration/Setup Utility
-----
Select Option:

System Summary
Product Data
Devices and I/O Ports
Date and Time
System Security
Start Options
Advanced Setup
ISA Legacy Resources
Advanced Power Management

Save Settings
Restore Settings
Load Default Settings

Exit Setup

-----
<F1> Help          <↑><↓> Move
<Esc> Exit         <Enter> Select
```

Figure 4-1. Configuration/Setup Utility Main Screen

Use the up and down arrow keys to highlight the option you want; then press Enter to select that option.

System Summary Option: When you select the **System Summary** option on the main Configuration/Setup Utility screen, the current system configuration is displayed, as illustrated in Figure 4-2. You cannot make any changes on this screen. The Configuration/Setup Utility program changes the information on this screen automatically after you add or remove options.

System Summary	
Processor	Pentium
Processor Speed	166 MHz
Math Coprocessor	Internal
System Memory	640 KB
Extended Memory	7168 KB
Video Controller	S3 Incorporated, Trio64V+
Cache Size	256 KB
Cache State	Enabled
Shadow RAM:	384 KB
Diskette Drive A:	[1.44 MB 3.5"]
Diskette Drive B:	[1.2 MB 5.25"]
Hard Disk Drive 0	Not installed
Hard Disk Drive 1	Not installed
Hard Disk Drive 2	345 MB
Hard Disk Drive 3	Not installed
Ethernet	Enabled
Mouse	[Installed]
<F1> General Help <Esc> Exit	

Figure 4-2. Example System Summary Screen

Product Data Option: When you select the **Product Data** option on the main Configuration/Setup Utility screen, the product information is displayed, as illustrated in Figure 4-3.

Product Data	
Machine Type/Model	7500MMM
Flash EEPROM Revision Level	LX96000US
System Board Identifier	IP501000063
System Serial Number	96G0000
BIOS Date	08/29/99

Figure 4-3. Example Product Data Pop-Up

Note: *System Board* refers to the processor card.

Devices and I/O Ports Option: When you select the **Devices and I/O Ports** option on the main Configuration/Setup Utility screen, the current configuration is displayed in a pop-up menu, as illustrated in Figure 4-4. You can modify the configuration information on this screen.

Devices and I/O Ports	
Mouse	[Installed]
Diskette Drive A:	[1.44 MB 3.5"]
Diskette Drive B:	[Not installed]
Serial Port Setup...	
Parallel Port Setup...	
Video Setup...	
IDE Drives Setup...	

Figure 4-4. Example Devices and I/O Ports Screen

Mouse

Indicates if an external mouse is attached. The Configuration/Setup Utility program automatically detects the absence or presence of a mouse when the system unit starts up.

Diskette Drive A/B

Displays the diskette drive configurations that you have selected. Use the left and right arrow keys to select the correct drive.

- 1.44 MB 3.5"
- 2.88 MB 3.5"

Serial Port Setup

Displays the Serial Port Setup pop-up, as illustrated in Figure 4-5.

Serial Port Setup...	
Serial Port A Address	[3F8h]
Serial Port A IRQ	[IRQ 4]
Serial Port B Address	[2F8h]
Serial Port B IRQ	[IRQ 3]

Figure 4-5. Example Serial Port Setup Screen

Serial Port A Address/IRQ

Serial Port B Address/IRQ

Shows the current port address and interrupt level. The interrupt level of each device helps the microprocessor prioritize tasks and manage those tasks that have a greater need. Use the right and left arrow keys to change the *interrupt request* (IRQ) settings so that each device has a unique setting. The DOS/Windows® and OS/2 serial port labels (such as COM1 and COM2) are displayed for each port. These settings rarely need to be changed from the default settings. To disable a serial port, select **Disable** in the address field. For more information about the serial ports, see page 4-23.

Parallel Port Setup

Displays the Parallel Port Setup pop-up, as illustrated in Figure 4-6.

Serial Port Setup...	
Parallel Port	[3BCh]
Parallel Port Mode	[Standard]
Parallel Port Extended Mode	[Bidirectional]
Parallel Port Extended Mode DMA	[No DMA]
Parallel Port IRQ	[IRQ 7]

Figure 4-6. Example Parallel Port Setup Screen

Parallel Port

Displays the current port address. Use the right and left arrow keys to change the setting so each device has a unique address. For more information about the parallel port, see page 4-24.

Parallel Port Mode

Indicates the present mode of operation of the parallel port attached to the processor card. You can select either Extended or Standard mode. In standard mode, you are limited to a write-only mode. In extended mode, you are offered four other modes that allow the parallel port both read and write function (see “Changing the Parallel-Port Mode” on page 4-25).

Parallel Port Extended Mode

You can change this field only if Extended is selected in the **Parallel Port Mode** field. In bidirectional mode, data can be written to or received from the attached device. This mode is compatible with the IBM Personal System/2® computer. The ECP (extended capabilities port) and EPP (enhanced parallel port) modes are industry-standard, high-performance, bidirectional modes. To use either ECP or EPP modes, make sure the attached device supports the extended mode.

Parallel Port Extended Mode DMA

Controls the parallel port’s ability to use DMA. The device attached to the parallel port must be able to support DMA.

Parallel Port IRQ

Displays the current interrupt level. Use the right and left arrow keys to change the setting so each device has a unique IRQ setting. For more information about the parallel port, see page 4-24.

Video Setup

Lets you customize video parameters, as illustrated in Figure 4-7.

Video Setup...	
Video Controller	S3 Incorporated, Trio64V+
Video Memory	2048 KB
DDC Monitor Checking	[Disabled]
Video Feature Connector	[Disabled]
Video Display Type	[IBM7573]
Monitor Horizontal Frequency	[Not Supported]
Refresh Rate for (640x480)	[85 Hz]
Refresh Rate for (800x600)	[75 Hz]
Refresh Rate for (1024x768)	[75 Hz]
Refresh Rate for (1280x1024)	[60 Hz]
Refresh Rate for (1600x1200)	[Not supported]

Figure 4-7. Example Video Setup Pop-Up

Video Controller

Identifies the video controller chip, or chip set, present on the processor card.

Video Memory

Displays the amount of video memory, in kilobytes, installed in the system unit. The video controller uses this memory to process images.

DDC Monitor Checking

Select **Enabled** to allow POST and setup to automatically detect monitors that support Display Data Channel 1 (DDC) specifications. If you are not using one of these monitors, select **Disabled** to reduce delays during power-on.

Video Feature Connector

Is always **Disabled**.

Video Display Type

Displays a field you can use to name the type of display you have attached to your system unit. The type of display you select from the list determines the video resolutions and refresh rates. If your display is not listed, you can select **Custom** or **User Defined** display types.

Monitor Horizontal Frequency

Displays the current horizontal frequency (*horizontal sweep rate*) for **User Defined** display types only. This field does not appear unless you select **User Defined** in the **Video Display Type** field. Refer to the documentation that came with your display to determine the highest horizontal frequency your display can support. If you change this option, your system unit automatically restarts when you exit the Configuration/Setup Utility program.

Refresh Rate for...

Lets you change the refresh rates for each resolution listed if you select **Custom** in the **Video Display Type** field. Refer to the documentation that came with your display for the proper settings. If you change this option, your system unit automatically restarts when you exit the Configuration/Setup Utility program.

IDE Drives Setup...

Displays information about the hard disk drives installed in the system unit. On the 7588 Industrial Computer, the first 3.5-inch drive is shown as **Hard Disk Drive 2**. If a 2.5-inch drive is installed, it is shown as **Hard Disk Drive 0**.

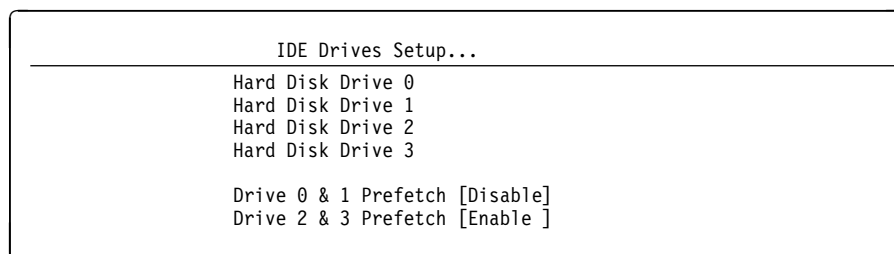


Figure 4-8. IDE Drives Setup Pop-Up

Hard Disk Drive x

Select one of these options to display a pop-up showing the size and IDE performance of the selected hard drive. For example, if you selected **Hard Disk Drive 0** from the IDE Drives Setup... screen, a pop-up similar to Figure 4-9 on page 4-12 would indicate the disk drive 0 size, and let you set the disk to utilize performance-enhancement features. (The Configuration/Setup Utility program changes the information in these fields automatically after you add or remove hard disk drives.)

Hard Disk Drive 0	
Size	541 MB
IDE Performance	[High Performance]

Figure 4-9. Example Hard Disk Drive 0 Pop-Up

Size

Displays the disk storage size.

IDE Performance

Displays the current mode selection, either High Performance or Compatible for the two IDE hard disk controllers on the processor card. The default selection is High Performance, and this mode makes use of all available functions. If you have an IDE device that is not capable of running in the high-performance mode, select Compatible mode to use the device in your system unit.

Note: When you select Compatible mode for a controller, any device attached to it is affected by the reduction in function. For example, if you select Compatible mode to accommodate a slower drive attached to the same controller, a high-performance hard disk does not operate as efficiently as it would in High Performance mode.

Drive x & x Prefetch

Lets you enable Read prefetching, which can improve your system performance. However, CD-ROM drives will not work and some operating systems will not work properly with Read prefetch enabled.

Date and Time Option: You can set the date and time for your system unit in two ways:

- Through the operating system (see your operating-system documentation for details)
- Through the Configuration/Setup Utility program

When you select the **Date and Time** option on the main Configuration/Setup Utility screen, date and time information is displayed as illustrated in Figure 4-10.

Date and Time	
Time	[10:53:35]
Date	[09/14/1995]

Figure 4-10. Example Date and Time Pop-Up

Time

Displays the current time. Type in the correct time in *hh:mm:ss* format.

Date

Displays the current date. Type in the correct date in the format of day, month, and year appropriate for your country.

The memory-retention battery keeps the internal clock active when you switch off your system unit.

System Security Option: When you select the **System Security** option on the main Configuration/Setup Utility screen, you can control access to diskette drive and (if applicable) hard disk drive read/write operations, set a power-on password to protect the information stored in your system unit, and set an administrator password to deny access to the Configuration/Setup Utility program. The following pop-up is displayed.

System Security	
Secure Hard Disk Drives and Diskette Drives	
Power-on Password	
Administrator Password	

Figure 4-11. System Security Pop-Up

Secure Hard Disk Drives and Diskette Drives

Lets you secure your disks and diskettes. Figure 4-12 illustrates the current access status.

Secure Hard Disk Drives and Diskette Drives Pop-Up	
Hard Disk Access	[Enabled]
Diskette Drive Access	[Enabled]

Figure 4-12. Example Secure Hard Disk Drives and Diskette Drives Pop-Up

Hard Disk Access

Displays the status of the hard disks (if applicable) attached to the IDE controller on the processor card. The Disabled setting prevents hard disks from reading or writing data, and all IDE disks will be shown as Not Installed on the System Summary screen. If you change this field, your system unit automatically restarts when you exit the Configuration/Setup Utility program.

Diskette Drive Access

Indicates internal diskette drives are Enabled (ready for read/write operations) or Disabled (not accessible for read/write operations). If you change this field, your system unit automatically restarts when you exit the Configuration/Setup Utility program.

Power-on Password

Lets you set, change, or delete your power-on password using the following pop-up.

Power-on Password	
Enter your new power-on password twice.	
Enter Power-on Password	[]
Enter Power-on Password Again	[]
Set or Change Power-on Password	
Delete Power-on Password	
Password Prompt	[On]

Figure 4-13. Power-on Password Pop-Up

Administrator Password

Lets you set, change, or delete this password to limit access to the Configuration/Setup Utility program using the following pop-up.

Administrator Password	
Enter your new administrator password twice.	
Enter Administrator Password	[]
Enter Administrator Password Again	[]
Set or Change Administrator Password	
Delete Administrator Password	
Power-on password changeable by user	[No]

Figure 4-14. Administrator Password Pop-Up

Start Options: When you select the **Start Options** option on the main Configuration/Setup Utility screen, you can change the startup options as illustrated in Figure 4-15. The startup devices options ignore devices that are not installed. The first installed diskette drive found will be Diskette Drive 0; the first hard disk drive found will be Hard Disk 0.

Start Options	
Keyboard NumLock State	[On]
Keyboard Speed	[Fast]
Disketteless Operation	[Disabled]
Monitorless Operation	[Enabled]
Keyboardless Operation Mode	[Enabled]
First Startup Device	[Diskette Drive 0]
Second Startup Device	[Hard Disk 0]
Third Startup Device	[Disabled]
Fourth Startup Device	[Disabled]
Power On Self Test	[Enhanced]
Power On Logos	[Enabled]
Power On F1/Esc Options	[Enabled]
Virus Detection	[Disabled]

Figure 4-15. Example Start Options Pop-Up

Keyboard NumLock State

Allows selection of the state of the NumLock key when you start the system unit, if keyboard is attached. Use the left and right arrow keys to choose On (sets the numeric keypad keys for use as numeric keys) or Off (sets the numeric keypad keys for use as cursor keys).

Keyboard Speed

Allows selection of the typematic rate (the speed at which the keyboard responds when you hold down a key), if a keyboard is attached. Use the left and right arrow keys to choose either Normal or Fast.

Disketteless Operation

Allows the system unit to run without a diskette drive.

Monitorless Operation

Allows the system unit to run without a display.

Keyboardless Operation Mode

Allows the system unit to function without a keyboard. This mode of operation is used commonly when the system unit has been set up as a network server. Select **Enabled** (sets the system unit to work without a keyboard) or **Disabled** (sets the system unit to work with a keyboard).

First/Second/Third/Fourth Startup Device

Shows the current device for each step in the startup process. This function defines the order in which the system unit looks for an operating system when it is started. You can have up to four devices in the startup sequence, if you have that many devices installed in your system unit. Use the right and left arrow keys to choose from a list similar to the following:

- Diskette Drive 0
- Hard Disk 0
- Hard Disk 1
- Network
- Disabled

The startup devices are listed based on their function. The first hard disk drive will be Hard Disk Drive 0, no matter which physical disk drive it is in the system unit. In the 7588 Industrial Computer, the first physical disk drive is 2, but it is listed as Hard Disk Drive 0 in the startup sequence.

Note: If you install a hard disk drive, make sure it is included in the startup options list; otherwise, you will not be able to boot your system unit from your hard disk drive.

Power On Self Test

Allows the selection of system testing that will be performed when the system unit is turned on. Select **Quick** or **Enhanced**.

Power On Logos

Lets you select the main power-on logos that are displayed. If disabled, only the copyright text is displayed.

Power On F1/Esc Options

Lets you enable or disable displaying of the message instructing the user to press F1 for setup or Esc for fast boot (the keys still function the same either way).

Virus Detection

Lets you enable or disable the built-in virus-detection program to run at boot time.

Advanced Setup Option: When you select the **Advanced Setup** option on the main Configuration/Setup Utility screen, the following pop-up is displayed.

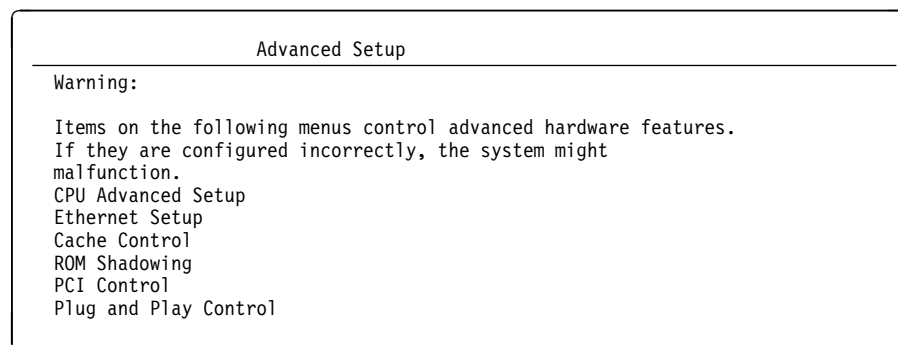


Figure 4-16. Advanced Setup Pop-Up

CPU Advanced Setup

Controls the burst mode of the microprocessor. It should always be **Disabled**.

Ethernet Setup

Lets you enable or disable the onboard Ethernet port. For configurations that do not have an onboard Ethernet port, it is always **Disabled**.

Cache Control

Lets you enable or disable the use of the memory cache.

Cache Control	
Cache State	[Enabled]
Cache Size	256 KB

Figure 4-17. Cache Control Pop-Up

ROM Shadowing

Lets you specify whether the information in ROM will be copied to system RAM (which will improve system performance), as illustrated in Figure 4-18. If the address range is used for an adapter card buffer, do not enable shadowing.

ROM Shadowing	
F0000h - FFFFFh (System BIOS)	Enabled
E8000h - EFFFFh:	[Enabled]
E0000h - E7FFFh:	[Enabled]
D8000h - DFFFFh:	[Disabled]
D0000h - D7FFFh:	[Disabled]
C8000h - CFFFFh:	[Disabled]
C0000h - C7FFFh (Adapter Video BIOS):	[Enabled]

Figure 4-18. Example ROM Shadowing Pop-Up

PCI Control

Controls the burst mode on the PCI bus. Some PCI cards will not function properly unless burst mode is **Disabled**.

Plug and Play Control

Lets you enable and disable the plug-and-play adapters' ability to alter the hardware configuration directly.

ISA Legacy Resources Option: When you select the **ISA Legacy Resources** option on the main Configuration/Setup Utility screen, the following pop-up is displayed.

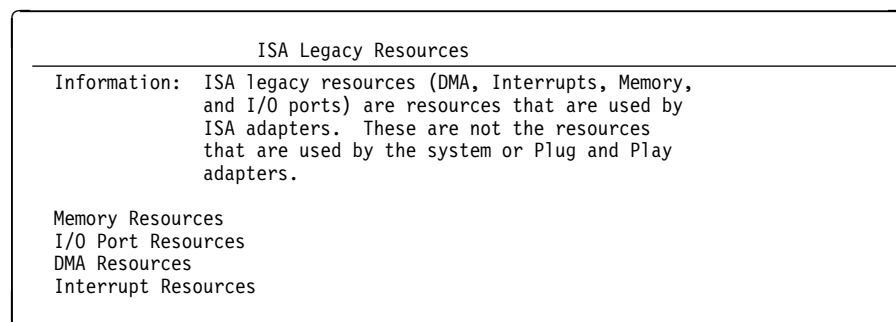


Figure 4-19. ISA Legacy Resources Pop-Up

This pop-up lets you allocate system resources to ISA Legacy adapters. There are three selections for each of the options on this pop-up:

- **System Resource** for a resource the system is using. This resource cannot be changed without disabling the resource that is using it. For example, Serial Port A uses IRQ 4, which is shown as a System Resource. If Serial Port A is disabled, IRQ 4 can be set to **Not Available**.
- **Not Available** to allow an ISA adapter to use the resource. It is not available to the PCI bus.
- **Available** to allow the PCI bus to use the resource. It is not available to the ISA adapter.

Memory Resources

Lets you allocate memory to an ISA Legacy adapter by selecting Not Available for that memory space. Figure 4-20 illustrates possible memory spaces.

Memory Resources		
A0000h - A3FFFh:	[System Resource]	
A4000h - A7FFFh:	[System Resource]	
A8000h - ABFFFh:	[System Resource]	
AC000h - AFFFFh:	[System Resource]	
B0000h - B3FFFh:	[System Resource]	
B4000h - B7FFFh:	[System Resource]	
B8000h - BBFFFh:	[System Resource]	
BC000h - BFFFFh:	[System Resource]	
C0000h - C1FFFh:	[System Resource]	
C2000h - C3FFFh:	[System Resource]	
C4000h - C5FFFh:	[System Resource]	
C6000h - C7FFFh:	[System Resource]	
C8000h - C9FFFh:	[Available]
CA000h - CBFFFh:	[Available]
CC000h - CDFFFh:	[Not Available]
CE000h - CFFFFh:	[Available]
D0000h - D1FFFh:	[Available]

Figure 4-20. Example Memory Resources Pop-Up

I/O Port Resources

Lets you allocate I/O ports for an ISA Legacy adapter by selecting Not Available for those ports. Figure 4-21 illustrates available I/O ports.

I/O Port Resources		
100h - 103h:	[System Resource]	
104h - 107h:	[System Resource]	
108h - 10Bh:	[Available]
10Ch - 10Fh:	[Available]
110h - 113h:	[Available]
114h - 117h:	[Available]
118h - 11Bh:	[Available]
11Ch - 11Fh:	[Available]
120h - 123h:	[Not Available]
124h - 127h:	[Available]
128h - 12Bh:	[Available]
12Ch - 12Fh:	[Available]
130h - 133h:	[Available]
134h - 137h:	[Available]
138h - 13Bh:	[Available]
13Ch - 13Fh:	[Available]
140h - 143h:	[Available]

Figure 4-21. Example I/O Port Resources Pop-Up

DMA Resources

Lets you allocate DMA channels to an ISA Legacy adapter by selecting Not Available for that channel. Figure 4-22 illustrates available channels.

DMA Resources		
Channel 0	[Available]
Channel 1	[Available]
Channel 2	[System Resource]	
Channel 3	[Available]
Channel 4	[Available]
Channel 5	[Not Available]
Channel 6	[Available]
Channel 7	[Available]

Figure 4-22. Example DMA Resources Pop-Up

Interrupt Resources

Lets you allocate an interrupt to an ISA Legacy adapter by selecting Not Available for that interrupt. Figure 4-23 illustrates the interrupt levels.

Interrupt Resources	
0:	[System Resource]
1:	[System Resource]
2:	[System Resource]
3:	[System Resource]
4:	[System Resource]
5:	[Available]
6:	[System Resource]
7:	[System Resource]
8:	[System Resource]
9:	[Available]
10:	[Not Available]
11:	[Available]
12:	[System Resource]
13:	[System Resource]
14:	[System Resource]
15:	[System Resource]

Figure 4-23. Example Interrupt Resources Pop-Up

Advanced Power Management Option: When you select the **Advanced Power Management** option on the main Configuration/Setup Utility screen, the following pop-up is displayed.

Advanced Power Management	
APM BIOS Mode	[Enabled]
Automatic Hardware Power Management	
Activity Monitor	

Figure 4-24. Advanced Power Management

Advanced Power Management (APM) lets you have your system unit enter one of three power-saving modes after a specified period of inactivity. When that period of time has elapsed, the BIOS can set the system unit to the specified power-saving mode. APM must be installed and configured in the operating system before power management will function.

APM BIOS Mode

Lets you enable or disable BIOS support for power management. When disabled, all power management is disabled.

Automatic Hardware Power Management

Lets you set the APM timer for each power-saving mode's inactivity period.

Automatic Hardware Power Management	
Automatic Hardware Power Management	[Enabled]
Time to Level 1 Power Management	[5 min]
Processor Speed	[25%]
Display	[Standby]
Time to Level 2 Power Management	[10 min]
Processor Speed	[01%]
Display	[Suspend]
Time to Level 3 Power Management	[15 min]
Processor Speed	[01%]
Display	[OFF]
Hard File	[Enabled]

Figure 4-25. Automatic Hardware Power Management

Activity Monitor

Lets you configure which system resources the system will monitor for power management. If a resource is enabled, any activity on that resource resets the APM timer.

Activity Monitor	
Hard Files	[Enabled]
IRQ1	[Enabled]
IRQ3	[Enabled]
IRQ4	[Enabled]
IRQ5	[Enabled]
IRQ6	[Enabled]
IRQ7	[Enabled]
IRQ9	[Disabled]
IRQ10	[Disabled]
IRQ11	[Disabled]
IRQ12	[Enabled]
IRQ13	[Enabled]
IRQ14	[Disabled]
IRQ15	[Disabled]

Figure 4-26. Activity Monitor

Device Drivers

Device drivers are programs that support a specific type of hardware device, such as a printer. They provide instructions that allow the system unit to interact with the device or take advantage of the special features of the device. The drivers might be included with your operating system or application programs. Hardware options also might include a diskette that contains the device drivers you need to make the options work.

Device drivers fall into two general categories:

- Device specific
- Application specific

Device-specific drivers load into memory each time you turn on the system unit. The CONFIG.SYS file contains the statements that control them. Some drivers check for the presence of a device each time you turn on the system unit. If the device it supports is not attached or not turned on, the driver does not load and might generate an error message. Once loaded, device-specific drivers stay in memory.

Application programs load application-specific drivers into memory. These drivers stay in memory while the application is running, and they generally clear from memory when you exit from the application. For more information about the CONFIG.SYS file, refer to your operating-system documentation and the documentation that comes with your hardware or device drivers.

Interrupt and DMA Assignments

Table 4-1 and Table 4-2 on page 4-22 outline the interrupt request assignments and direct memory access (DMA) channel assignments for your system unit. If you install industry-standard architecture (ISA) bus adapters in your system unit, be sure that no interrupts or DMA channels conflict with existing resources. For example, do not set an ISA adapter to use interrupt (IRQ) 14 because IRQ14 is used by the IDE hard disk drive.

Interrupt Request Assignments: The following table outlines the interrupt request assignments.

Table 4-1. Interrupt Request Assignments	
Interrupt Request	System Resource
NMI	Parity error or channel check
0	Reserved (interval timer)
1	Reserved (keyboard buffer full)
2	Reserved (cascade interrupt from slave PIC)
3	Serial port 2
4	Serial port 1
5	Available (parallel port 2, or can be used by either AT- or PCI-bus adapters – see note)
6	Diskette drive
7	Parallel port 1
8	Real-time clock
9	Available (can be used by either AT- or PCI-bus adapters – see note)
10	Available (can be used by either AT- or PCI-bus adapters – see note)
11	Onboard Ethernet (optional)
12	Mouse port, if enabled; otherwise, it is available
13	Reserved (math coprocessor)
14	IDE hard disk drives
15	Alternate IDE hard disk drives

Note: NMI is the abbreviation for *non-maskable interrupt*. PIC is the abbreviation for *programmable interrupt controller*.

For interrupts 5, 9, 10, and 11, at least one must be available for PCI adapters if any PCI adapters are installed. Interrupt 9 can be used as the vertical retrace interrupt by some software, so it might not always be available.

DMA Channel Assignments: The following table outlines the DMA channel assignments.

Table 4-2. DMA Channel Assignments		
DMA Channel	Data Width	System Resource
0	8 bits	Available
1	8 bits	Available
2	8 bits	Reserved (diskette drive)
3	8 bits	Available (used by parallel port when in extended capabilities, ECP, mode)
4		Reserved (cascade channel)
5	16 bits	Available
6	16 bits	Available
7	16 bits	Available

Jumpers and Switches

Jumpers are located on the processor card and can help you customize the way your system unit operates. See Appendix D, “Jumpers, Switches, and Pin Assignments” for jumper locations, descriptions, and instructions on how to change jumpers.

Memory-Retention Battery

The system unit has a special type of memory that maintains the date, time, and settings for built-in features. The memory-retention battery, located on the processor card, keeps this information active when the system unit is powered off. This battery requires no charging or maintenance throughout its life, but it might need to be replaced at some point in time.

If the memory-retention battery fails or you replace the processor card, a message similar to the following appears on the display screen when the system unit is powered on (after you bypass the “POST error(s) detected” message).

The following error(s) were detected when the system was started.

161 Bad CMOS Battery

Press Enter to run the Configuration/Setup Utility Program or Esc to continue.

You might see other error codes displayed after the 161 error.

Serial Port

You can use the serial ports to add *external devices*, such as a plotter, scanner, external modem, or serial printer. The serial ports provide an effective way of communicating with a variety of serial devices. You also can use it to set up communications between two system units using a null modem or over telephone lines using a modem.

The serial port sends and receives data 1 bit at a time, as opposed to the parallel port, which sends and receives 8 bits at a time. The serial port can transmit data at speeds ranging from 300 to 19.6K bits per second. The bits-per-second measurement is commonly referred to as the *baud rate*.

Your system unit has two 9-pin serial ports: A and B. Both Serial Port A and Serial Port B are 16550A-compatible connections.

You can add another serial port by installing a serial adapter in one of the available expansion slots.

Serial-Port Assignments: Software distinguishes Serial Port A from Serial Port B by the serial-port I/O address assignment. No two serial ports can be set the same. Most adapters that provide serial communications use jumpers or switches to set the serial-port I/O address assignment.

You can change the assignment of the built-in serial ports by using the Configuration/Setup Utility program. You can set each serial port to one of the following settings:

- 3F8h using IRQ 4
- 2F8h using IRQ 3
- 3E8h using IRQ 4
- 2E8h using IRQ 3
- Disabled

The factory sets the serial ports to 3F8h and 2F8h.

Many operating systems and application programs have setup programs that define the location and speed (baud rate) of a modem, or the location and type of serial printer. These programs use "COM" (short for "Communications") to refer to the serial ports. For example, COM1 is assigned to I/O address 3F8h. If you are not sure of your serial-port assignment, use the Configuration/Setup Utility program to view it.

Viewing/Changing the Serial-Port Assignments: To view/change the serial-port assignment, do the following.

1. Access the Configuration/Setup Utility program main screen. (See the procedure on page 4-7 if you need assistance.)
2. Select the **Devices and I/O Ports** option.
3. Use the up arrow and down arrow keys to highlight one of the two serial port settings.
4. Use the left arrow and right arrow keys to change the setting in this field. The utility program will not allow you set both ports to the same setting.
5. Press Esc to exit from the Configuration/Setup Utility program and save your changes.

You also can disable each serial port if you want to prevent unauthorized transmission of data to any attached serial device, such as an external modem or serial printer.

Use the left arrow and right arrow keys to select the Disabled setting in each serial port field.

Installing an External Serial Device: Adding an external device to your system unit requires the use of a serial cable (purchased separately). Use Serial Port A for high-speed modem and printer connections, or for devices such as a mouse or other pointing device. To complete the installation, do the following.

1. Plug one end of the serial cable into Serial Port A or B (refer to Figure 1-3 on page 1-3).
2. Plug the other end of the serial cable into the external device. (If the serial cable does not fit, you may need to purchase a cable adapter.)
3. Make any adjustments or add any features needed to operate the device. For example, your external device may require additional software or special settings. For detailed requirements, read the installation instructions that came with the external device.

Parallel Port

The parallel port is most often used to communicate with a parallel printer; however, parallel communication is an effective method of communicating with a variety of parallel devices.

The parallel port can send and receive data 8 bits at a time, as opposed to the serial port, which sends and receives 1 bit at a time. Although the parallel port has 25 pins, only 8 of them are used to transfer data; the rest are used for control or status functions, and grounding.

Your system unit has one parallel port as a standard, built-in feature. You can increase the number of parallel ports by installing a parallel adapter in one of the system unit expansion slots.

Parallel-Port Assignments: Software distinguishes one parallel port from another by the parallel-port assignment. Most adapters that provide parallel communication use jumpers or switches to set the parallel-port I/O address assignment. No two parallel ports can be set the same. You can change the assignment of the built-in parallel port by using the Configuration/Setup Utility program.

You can set the built-in parallel port to any of the following settings:

- 3BCh using IRQ 7
- 378h using IRQ 5
- 278h using IRQ 5
- Disabled

The factory sets the parallel port to 3BCh.

Many operating systems and application programs have a setup program that defines the location of the printer and the type of printer attached. Many use “LPT” (for line printer) to refer to the parallel ports.

Viewing/Changing the Parallel-Port Assignment: To view/change the parallel-port assignment, do the following.

1. Access the Configuration/Setup Utility program main screen. (See the procedure on page 4-7 if you need assistance.)
2. Select the **Devices and I/O Ports** option.
3. Use the up arrow and down arrow keys to highlight the parallel port field setting.
4. Use the left arrow and right arrow keys to change the setting in this field.
5. Press Esc to exit from the Configuration/Setup Utility program and save your changes.

You also can disable the parallel port if you want to prevent unauthorized transmission of data to any attached parallel device, such as a printer or external tape drive. Use the left arrow and right arrow keys to select the Disabled setting in the parallel port field.

Installing an External Parallel Device: Adding an external device to your system unit requires the use of a parallel cable (purchased separately). To complete the installation, do the following.

1. Plug one end of the parallel cable into the parallel port on the back of the system unit (refer to Figure 1-3 on page 1-3).
2. Plug the other end of the parallel cable into the external device. (If the parallel cable does not fit, you may need to purchase a cable adapter.)
3. Make any adjustments or add any features needed to operate the device. For example, your external device may require additional software or special settings. For detailed requirements, read the installation instructions that came with the external device.

Changing the Parallel-Port Mode: The parallel port can operate in four different modes:

- **Standard** enables write-only mode.
- **Bidirectional** (read/write) enables data transfer with other system units and supported parallel-port security devices.
- **ECP** (extended capabilities mode) is a bidirectional protocol enhancement for high-performance printers. New printers that take advantage of this mode indicate ECP support in their documentation. Address setting 3BCh does not support ECP mode.

- **EPP** (enhanced parallel port) is an industry-standard, high-performance, bidirectional mode. It provides higher performance than the bidirectional mode and allows the attachment of communication devices (modem and LAN adapters) in addition to printers. Address setting 3BCh does not support ECP mode.

You can set these different modes of operation for the parallel port, as well as disabling the port, using the Configuration/Setup Utility program. Use the following steps to change the parallel-port assignment.

1. Access the Configuration/Setup Utility program main screen. (See the procedure on page 4-7 if you need assistance.)
2. Select the **Devices and I/O Ports** option.
3. Use the up arrow and down arrow keys to highlight the **Parallel Port Mode** field.
4. Use the left arrow and right arrow keys to change the setting in this field to Extended or Standard.
5. If you select Extended mode, use the down arrow key to highlight the **Parallel Port Extended Mode** field, and use the left and right arrow keys to select the desired mode.
6. Press Esc to exit from the Configuration/Setup Utility program and save your changes.

If you change this option, your system unit automatically restarts when you exit the Configuration/Setup Utility program.

SVGA Video

Your system unit supports both SVGA (super video graphics array) and VGA (video graphics array) levels of resolution. SVGA is a video standard that displays high-resolution, 1024 x 768 graphic images. With 2 MB of video memory standard, you can view the following SVGA modes:

- Up to 256 colors simultaneously at 1280 x 1024 resolution
- Up to 65536 colors simultaneously at 1024 x 768, 800 x 600, or 640 x 480 resolution
- Up to 16,777,216 colors at 800 x 600 and 640 x 480 resolution

The SVGA video also is fully compatible with all standard VGA modes.

Advantages of Using SVGA: The SVGA video controller provides easy-to-read text and graphics at new levels of performance. With the new fast-refresh non-interlaced displays, you will find flicker and jitter a thing of the past.

The SVGA controller provides excellent on-screen performance, and uses its local bus capabilities to process tasks. This provides better overall system performance.

Software Compatibility with SVGA: The SVGA video controller can display application programs written for any of the following video standards.

Standard	Resolution	Colors
MGA (Monochrome Graphics Adapter)	720 x 350	----
CGA (Color Graphics Adapter)	320 x 200	4
EGA (Enhanced Graphics Adapter)	640 x 350	16
MCGA (Multicolor Graphics Array)	320 x 200	256
	640 x 480	2
VGA (Video Graphics Array)	640 x 480	256
SVGA (Super Video Graphics Array)	640 x 480	16777216
	800 x 600	65536
	1024 x 768	65536
	1280 x 1024	256

Some application programs require video device drivers to use the super-graphics modes. The device-driver package shipped with your system unit provides device drivers for some application programs and operating systems that do not have SVGA support built in. Refer to the device-driver package for installation instructions and additional information about the individual drivers.

Some application programs provide their own video device drivers to take advantage of SVGA modes. These device drivers are installed through a setup program built into the application program. Setting up these applications to operate in the super video modes can be confusing, because terminology for these modes has not been standardized throughout the industry. The following lists some terms commonly used in application programs to describe the SVGA modes:

- High resolution
- Super VGA or SVGA
- Extended VGA or EVGA
- 1024 x 768

Terms like *high resolution*, *super VGA*, and *extended VGA* do not have the same meaning as *1024 x 768*. If you find these terms used by your application program, refer to the documentation that came with the program for additional information.

Display Support: The SVGA controller provides support for a wide variety of displays. The following list describes the categories of supported displays.

- 640 x 480 (60-, 72-, 75-Hz non-interlaced displays)
- 1024 x 768 (60-, 70-, 72-, 75-Hz non-interlaced displays and 43-Hz interlaced displays)
- 1280 x 1024 (60-, 73-, 75-Hz non-interlaced displays and 43-Hz interlaced displays).

Video Configuration: You can view the current settings for your video features by selecting the **Video Setup** on the Devices and I/O Ports screen of the Configuration/Setup Utility program. The information identifies your current video controller and the amount of usable video memory you have available.

Special Characters and Languages: The SVGA video controller can display a variety of characters and languages. The language that is supported depends on the *code page* loaded by your operating system. Following is a list of supported code pages.

Language	Code Page
Multilingual	437
Multilingual	850
Portuguese	860
Canadian French	863
Nordic	865
Russian	982

You can find additional information about code pages in your operating-system documentation.

System Programs

The system programs contain the power-on self-test (POST) routines and the Basic Input/Output System (BIOS) instructions. These programs are contained in *Flash EEPROM* modules on the processor card.

Updating the Flash EEPROMs: As part of the continuing work to improve quality, IBM might make changes and enhancements to the POST routines and BIOS instructions that are on the processor card. You can use the revision level to determine if a later version is available. If updates are required for the Flash EEPROM, updated versions of the system programs will be made available on an Update diskette, along with complete instructions. See “BIOS Levels” on page 8-2 and “Flash (BIOS/VPD) Update Procedure” on page 8-2 for more information.

You can verify the Flash EEPROM update by selecting the **Product Data** option on the Configuration/Setup Utility program main screen. For information about the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility Program” on page 4-6.

Chapter 5. Solving Problems

This chapter contains information that could help you solve some problems that might arise with your system unit. The chapter is organized as follows:

- “Diagnostic Tools” describes the diagnostic tools available to you for solving system unit problems.
- “Testing the System Unit” on page 5-2 describes what to check before testing the system unit, and how to start and run the test programs.
- “Troubleshooting Charts” on page 5-3 helps you quickly find solutions for most system unit problems.
- “Error Messages” on page 5-9 lists messages you might see on your screen when you either have a hardware problem or change the system unit setup.

If you are unable to resolve a problem using this information, you should call for the assistance of a trained service technician.


Diagnostic Tools

The following tools are available to diagnose hardware-related problems:

Power-on Self-Test (POST)

Each time you turn on the system unit, it performs a series of tests that check the operation of the base system unit. This series of tests is called the *power-on self-test* or *POST*. This test:

- Checks basic system-board operations
- Checks the memory operation
- Compares the current system configuration with that established by the Configuration/Setup Utility program
- Starts the video operation
- Verifies that the diskette drive is working
- Verifies that the hard disk drive is working

While the memory is tested, numbers indicating the amount of available base and extended memory appear in the top-left corner of your screen, and the Configuration/Setup Utility program symbol  appears in the top-right corner of your screen.

Note: The amount of available memory shown might be less than expected because of basic input/output (BIOS) shadowing in random access memory (RAM).

Configuration/Setup Utility Program

The Configuration/Setup Utility program lets you view and change important information about your system unit's hardware. Also, it displays text messages describing POST errors. For detailed information about using the Configuration/Setup Utility program, see “Using the Configuration/Setup Utility Program” on page 4-6.

If your Configuration/Setup Utility program normally displays in your native language, but then displays in English or a language other than your own, call for service.

Diagnostic Programs

Your 7588 Industrial Computer comes with a Diagnostics diskette, which contains the hardware diagnostic programs. Use this diskette when you suspect a hardware failure. This program requires minimal interaction from you. You can use it to test the base system unit, as well as the keyboard and some external devices.

Troubleshooting Charts

The troubleshooting charts list symptoms of problems (such as “The mouse is not working”), as well as steps to correct the problem.

Error Messages

Error messages that appear on the screen might be text, numeric, or both. There are three types of error messages:

- *POST error messages* appear if POST finds a problem.
- *Diagnostic error messages* appear if a problem is detected by the test program.
- *Software-generated error messages* appear if a problem or conflict is detected by the application program, the operating system, or both. For an explanation of these messages, refer to the information that came with the software package.

Testing the System Unit

The test programs are designed to test *IBM* products only. Non-IBM products might present misleading error messages or unexpected system unit responses. If you want to test a non-IBM product, refer to the information that came with the product.

If the system unit does not start when you press the power switch, do the following.


1. Make sure all cables are connected securely to the correct locations.
2. Check to see if the voltage-selection switch is set to the correct position.

Starting the Computer

Note: For the following procedure, if the Enter password message appears on the screen, a power-on password is set. Type the correct password, and then press Enter to continue.

1. Turn on all external devices, and then turn on the system unit.
2. Watch the screen, and listen for a single beep. Numbers indicating the amount of base memory and extended memory are displayed in the upper-left corner of the screen while the system unit is running POST.

Note: The amount of available memory shown is less than expected because of BIOS shadowing in RAM.

The Configuration/Setup Utility program symbol  appears in the upper-right corner of the screen.

- If POST completes its testing without detecting any problems, the system sounds a single beep; then the operating system starts to load.
- If POST detects a problem, an error code will be displayed in the upper-left corner of your screen, and you will hear something other than a single beep (more than one beep or no beep).

A single problem can cause several error messages to appear. If you have multiple error messages, determine the cause of the first error message; then retest.

- For any other condition, have the system unit serviced.

3. Find your system unit response in the following table; then go to the section specified.

System unit response	Go to:
Application program or operating system appears.	"Starting the Diskette-Based Diagnostic Program."
Blank screen, unreadable screen, or other response.	"Troubleshooting Charts."
POST error code or message appears.	"Error Messages" on page 5-9.

Starting the Diskette-Based Diagnostic Program

The diagnostic programs found on the Diagnostics diskette can be used to test the system unit and many of its components. To start the diagnostic programs, do the following.

1. Turn off the system unit.
2. Insert the Diagnostics diskette into the primary diskette drive.
Note: If the computer does not have a diskette drive, have the network administrator make the diskette image available; then continue with the next step.
3. Turn on the system unit.
4. When the Main Menu appears, follow the instructions on the screen to make your selections.
Note: If the Main Menu screen does not appear and there is no error indication, or if the system unit hangs after you start the diagnostic program, have the system unit serviced.

If testing does not find a problem, but you still have one, go to "Troubleshooting Charts" and look for the problem symptom.

Troubleshooting Charts

If you have just added new software or a new option and your system unit is not working, do the following before using the Troubleshooting chart.

- Remove the software or device you just added
- Run the diagnostic programs to determine if the system unit is running correctly.
- Reinstall the new software or new device

You can use the troubleshooting charts in this chapter to find solutions to problems that have definite symptoms. These charts are arranged alphabetically. Look for your symptom in the left column of the chart. Instructions and probable solutions to your problem are in the right column of the chart.

Diskette Drive Problems	Action
Diskette drive in-use light stays on or the system unit bypasses the diskette drive.	<p>If there is a diskette in the drive, verify that:</p> <ol style="list-style-type: none"> 1. The diskette is good and not damaged. (Try another diskette you know to be good.) 2. The diskette is inserted correctly (label up and metal-shutter end first) in the drive. 3. The diskette contains the necessary files to start the system unit. 4. Your software program is OK (see page 5-9). <p>If the diskette drive in-use light stays on, or the system unit continues to bypass the diskette drive, have the system unit serviced.</p>

Display Self-Tests	Action
Some displays have their own self-tests.	<p>If you suspect a problem with your display:</p> <ol style="list-style-type: none"> 1. Turn off the display and system unit. 2. Disconnect the display signal cable from the system unit. 3. Set the Brightness and Contrast controls to the center position. 4. Turn on the display. 5. Is the screen white in the center with some shading near the edges, and does it have a black strip on either one side, both sides, top, or bottom? <p>Yes The display has successfully passed the self-test. Refer to the instructions supplied with your display for additional testing information. If you still have a problem with the display, and you have not already done so, check "Display Problems" below.</p> <p>If you still cannot find the problem, have the display and system unit serviced.</p> <p>No Refer to the instructions supplied with your display for further testing information.</p>

Display Problems	Action
Wavy, unreadable, rolling, or distorted screen, or screen jitter.	<p>Perform the following:</p> <ol style="list-style-type: none"> 1. Make sure that other devices are not affecting the display image. Magnetic fields around transformers, appliances, fluorescent lights, or other displays can cause the image to be wavy, unreadable, rolling, jittery, or distorted. If this happens, turn off the display and move the device and the display at least 305 mm (12 inches) apart. Turn the display on. <p>Note: The distance between displays and diskette drives should be at least 76 mm (3 inches) to prevent read and write errors.</p> <ol style="list-style-type: none"> 2. Check the video device settings are set correctly (refresh rate, number of colors, and resolution). Change it if necessary. <p>If the problem remains, have the display and system unit serviced.</p>
The display works when you turn on the system unit but goes blank when you start an application program.	<p>Perform the following:</p> <ol style="list-style-type: none"> 1. Check that the primary display cable is connected to the video connector. 2. Check that the software program is OK. 3. Run the diagnostic tests to isolate the cause of the problem.
Blank screen and no beep. Note: If you are not sure you heard a beep, restart the system unit.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The power cable is plugged into a working electrical outlet and into the system unit. 2. The cables are connected to the system unit correctly. 3. The system unit and display are turned on. 4. The voltage-selection switch is set to the correct position. 5. Any recent upgrades are installed correctly. <p>If the items above are correct and the screen remains blank, have the system unit serviced.</p>
Blank screen and one beep.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The display power cable is connected to the display and to a working electrical outlet. 2. The display is turned on and the Brightness and Contrast controls are adjusted correctly. 3. The display signal cable is connected to the correct connector on the system unit. <p>If the screen remains blank, run the display self-tests (see page 5-4). If those tests show the display is OK, have the system unit serviced.</p>
Blank screen, a continuous beep, or more than one beep.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The voltage selection switch is properly set for the electrical power used in your country. <p>If the voltage selection switch is in the correct position and the system continues to show no response, have the system unit serviced.</p>
Blank screen and three beeps.	<p>POST could not find usable 640 KB of memory required to start the system unit.</p> <p>Have the system unit serviced.</p>
Only the cursor “ _ ” appears.	<p>Have the system unit serviced.</p>
Wrong characters appear on the screen.	<p>Have the system unit serviced.</p>

General Problems	Action
Problems such as broken cover locks or indicator lights not working.	Have the system unit serviced.

Intermittent Problems	Action
A problem occurs only occasionally and is difficult to detect.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. All cables and cords are securely connected to the rear of the system unit and attached options. 2. When the system unit is turned on, air is flowing from the rear of the system unit at the power supply fan grill. If there is no air flow, the power supply fan is not working. This causes the system unit to overheat and shut down. <p>Run the diagnostic tests in loop mode to verify that the system unit components are working correctly.</p> <p>If the items above are correct and the test programs found no problem, the next time the problem occurs, make a note of what the problem is and what the system unit is doing when the problem occurs. Then contact your place of purchase or service technician for help.</p>

Keyboard, Mouse, or Pointing-Device Problems	Action
All or some keys on the keyboard do not work.	<p>Verify that the keyboard cable is securely connected to the correct port on the system unit.</p> <p>You might have a password or the unattended start mode set. To use the system unit, enter the correct password.</p> <p>If the password is not working correctly, have the system unit serviced.</p> <p>If you forget your power-on password, you can erase it by removing the memory-retention battery for 10 minutes, reinstalling it, configuring the system unit, and setting a new power-on password.</p> <p>Run the diagnostic tests to verify the system unit components are working correctly.</p> <p>If the test programs do not find the problem, have the keyboard, keyboard cable, and system unit serviced.</p>
The mouse or pointing-device does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The mouse or pointing-device roller ball is clean. 2. The mouse or pointing-device cable is securely connected. 3. The device drivers are in the correct path and are installed correctly. 4. The mouse drivers are loaded. 5. The mouse cable is securely connected to the correct port on the system unit. 6. The unattended start mode is not set. The unattended start mode disables the pointing-device port when the system unit is turned on, and the device driver will not be loaded. <p>Note: The pointing-device port is also known as the auxiliary-device port or mouse port.</p>

Option Problems	Action
An option that was just installed does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The option is designed for the system unit. 2. You followed the installation instructions supplied with the option. 3. The option is installed correctly. 4. You have not loosened any other installed options or cables. 5. There are no interrupt or address conflicts. Check any switches on all the installed options to ensure that their interrupts and addresses are not the same. <p>Run the IRQ/DMA test located on the Diagnostics diskette. If the test programs find no problem, have the system unit or the option serviced.</p>
An option that used to work does not work now.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. All the option hardware and cable connections are secure. Reseat the option if you are not sure. 2. There are no interrupt or address conflicts. Check any switches on all the installed options to ensure that their interrupts and addresses are not the same. <p>If the option came with its own test instructions, use those instructions to test the option.</p> <p>If the items above are correct and the test programs found no problem, have the system unit and option serviced.</p>

Power-on Problems	Action
No beep, power-on indicator does not come on, and power supply fan does not run.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The power cables are plugged into properly grounded, operational, electrical outlets and are connected correctly to the system unit components. 2. The voltage-selection switch is set to the correct position. <p>If the items above are correct, have the system unit serviced.</p>
No beep during POST.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. All the option hardware and cable connections are secure. Reseat the options if you are not sure. 2. The voltage-selection switch is set to the correct position. <p>If the items above are correct, have the system unit and option serviced.</p>
No beep, power supply fan runs, power-on indicator is on, and system unit stops during POST with a message displayed.	<p>Go to "POST Messages" on page 5-10.</p> <p>If the error message displayed is not listed, have your system unit serviced.</p>
No beep and the system unit otherwise is functional.	Have the system unit serviced.

Printer Problems	Action
The printer does not work.	<p>Verify that:</p> <ol style="list-style-type: none"> 1. The printer is turned on and is online. 2. The printer signal cable is connected to the correct parallel or serial connector on the system unit. <p>Note: Non-IBM printer cables may cause unpredictable problems.</p> <ol style="list-style-type: none"> 3. The printer is working correctly by running the tests described in the printer manual. 4. You have assigned the printer port correctly in your operating system or application program. <p>Run the Printer Test and port diagnostic test included with the system diagnostic programs. If the port diagnostic tests show the system unit is OK, replace the printer cable.</p>

Screen Messages	Action
An I9990301 message	<p>A hard disk drive problem occurred. Do the following:</p> <ol style="list-style-type: none"> 1. Verify that cables connected to the hard disk drive are secure. 2. If you just installed a secondary hard disk drive, verify that the drive jumpers are set correctly. 3. Run the diagnostic tests to verify that the hard disk drive is working correctly. 4. If the hard disk drive is not working correctly, have the system unit serviced.
An I9990305 message	<p>An operating system could not be found.</p> <p>Run the diagnostic tests to verify the hard disk drive is working correctly. If there is a problem with the hard disk drive (such as a bad sector), you might have to reinstall the operating system.</p>
Password prompt	<p>A power-on or administrator password is set. To use the system unit, enter the correct password.</p> <p>If the password is not working correctly, have the system unit serviced.</p> <p>If you forget your power-on password, you can erase it by removing the memory-retention battery for 10 minutes, reinstalling it, configuring the system unit, and setting a new power-on password.</p>
Error prompt —or— Any other information or message.	<p>Do the following:</p> <ol style="list-style-type: none"> 1. Turn off the system unit. 2. Insert the Diagnostics diskette in the primary diskette drive. 3. Turn on the system unit. 4. If the error appears again, have the system unit serviced. 5. If the error does not appear again, follow the screen messages. When the Main Menu appears, follow the instructions on the screen to make your selections. <p>If the Main Menu does not appear, have the system unit serviced.</p>